Trend Study 10-12-00

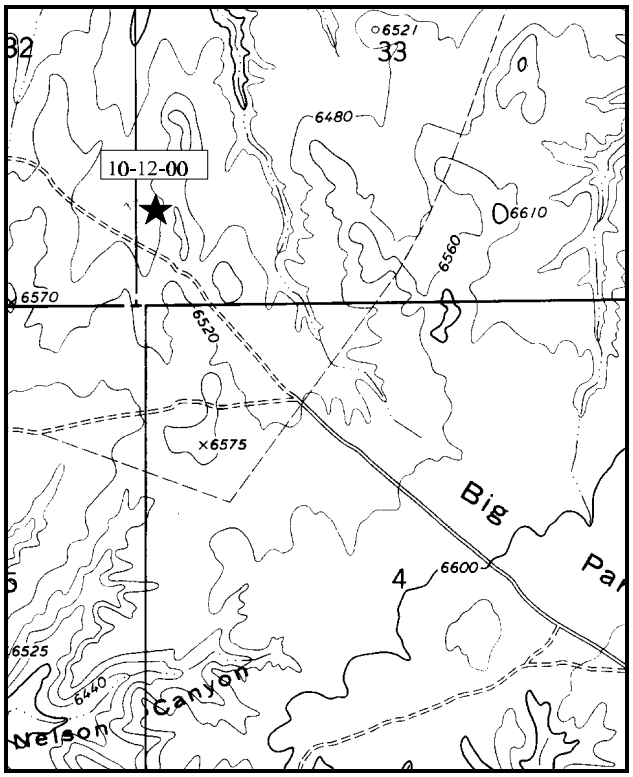
Study site name: Wolf Den . Range type: Big Sagebrush .

Compass bearing: frequency baseline 167°M .

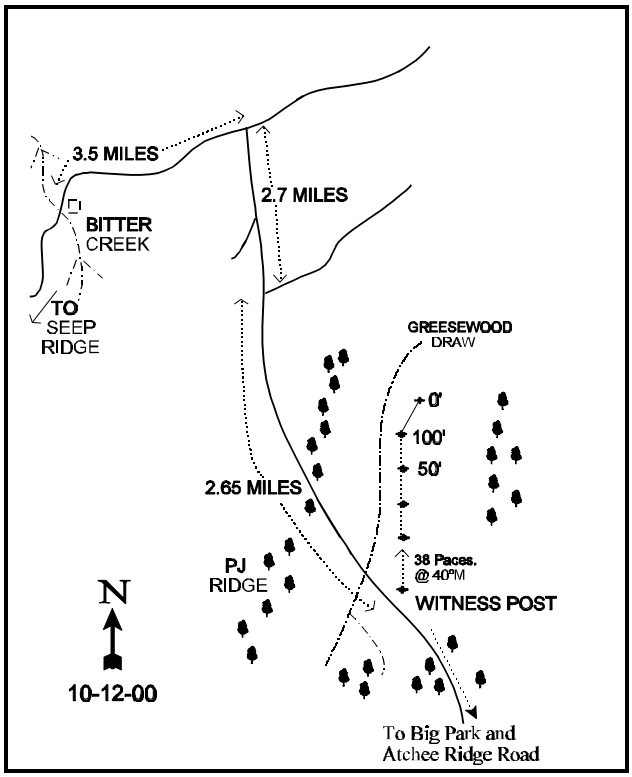
First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the Seep Ridge Road, about 10 miles north of Pine Spring, turn onto the Bitter Creek Road near McCoy Reservoir. Drive easterly on this road for 2.4 miles to a cattle guard. Continue 5.4 miles to a corral in the bottom of Bitter Creek. Drive up out of the Bitter Creek canyon 3.5 miles. Where the road tops out, turn right off the main road. Go 2.7 miles to a minor fork. Continue straight on the main road for 2.65 miles to the east edge of a sagebrush/greasewood draw. There is a witness post 15 feet off the north side of the road. From the witness post walk 38 paces bearing 40° to the 400 ft. baseline stake. The 0-foot baseline stake, tagged #9098, is 400 feet north.
Alternate route: From the intersection of Atchee Ridge Road and Big Park Road travel north toward Big Park 3.45 miles to a fork. Stay left and continue 0.15 to another fork. Go straight to Big Park for 5.7 miles to a cattle guard and a fork. Proceed right for 0.4 miles to the witness post.



Map Name: Burnt Timber Canyon .



Diagrammatic Sketch

Township 12S , Range 24E , Section 3

UTM. 4398779.273 N, 650483.663 E

DISCUSSION

Trend Study No. 10-12 (16A-12)

The Wolf Den trend study is located in a very dense stand of Wyoming big sagebrush along a wide swale between low ridges of pinyon and juniper. The area, near Big Park, is considered critical deer winter range, and also has some light use by elk. More pellet groups have been found on this study site than any other sampled on the herd unit in the past. Pellet group transect data in 2000 indicate heavy use by deer with an estimated 116 deer days use/acre (287 ddu/ha), and light use by elk with an estimated 3 elk days use/acre (7 edu/ha). No cattle pats were sampled in 2000, although cows were in the general area surrounding the Wolf Den transect when the site was read in June 2000. This area is used by cattle on a rotational deferment system anytime from November through April, depending on amounts of snow and other management considerations.

The study site slopes gently to the west at an elevation of 6,500 feet. The drainage basin is sufficiently small at the head that there are no gully patterns resulting from excessive runoff. Although the dense brush provides excellent canopy cover, the understory is very limited (makes up less than 5% of total vegetative cover) and the low amounts of litter are easily displaced. There was a moderate amount of bare ground in 2000 (19%). Cryptogamic crusts exist almost entirely underneath the sagebrush canopy. The soil is relatively deep with an estimated effective rooting depth of over 26 inches. Average soil temperature is 56°F at 18 inches. A stoniness index determined from penetrometer readings illustrates the deepness of the soil with nearly all measurements being over 20 inches in depth. However, very little rock was sampled in the profile and the index at this site is more a measure of a restrictive layers of soil than actual rockiness. The soil is a loam that is low in phosphorus (3.5 ppm), where 10 ppm has been shown necessary for normal plant growth and development. The soil reaction is moderately alkaline (pH of 8).

This study is located on a site dominated by Wyoming big sagebrush. Shadscale is found on the upper, more shallow portions of the swale, while greasewood grows along the lower reaches of the depression. The sagebrush on the site is so dense that it is difficult to travel through it, confirming the estimate of 32% sagebrush cover in both 1995 and 2000. Sagebrush currently (‘00) provides 77% of the browse cover and 74% of the total vegetative cover at the Wolf Den site. Shrub density estimates for 1988 indicated a population of 18,133 plants/acre. Density of sagebrush was estimated at 7,580 plants/acre in 1995 and 7,260 plants/acre in 2000. The difference in population estimates is primarily the result of the increased sample size and better sampling distribution used after mid-1992. These modifications enlarge the sampling area and give much better estimates for shrubs with discontinuous and/or clumped distributions. This old sagebrush stand contained 78% mature and 19% decadent individuals in 1995. Decadency increased in 2000 to 42%. Thirty percent of the decadent individuals are classified as dying in 2000, which translates into about 920 plants/acre. Recruitment from the young age class is currently moderately low at 6%. Vigor improved in 1995 (10% vs 3% in poor vigor), but in 2000, poor vigor increased to 13% of the population. Use is currently moderate to heavy with 38% displaying moderate use and 18% of the population showing heavy use. These utilization estimates are lower than those in 1995 where 65% of the population showed moderate use and 20% displayed heavy use. The current condition of high decadency and reduced vigor is probably due to intraspecific competition combined with extended drought and use by wintering deer.

Greasewood is currently (‘00) estimated at 800 plants/acre. It provides 12% of the total vegetative cover at the site. Thirty percent of the population is currently (‘00) classified as decadent. Mature plants average 3 ½ feet in height with a 4 ½ foot crown.

The high sagebrush density and associated cover severely limits understory plants. Only four or five species of perennial grass were sampled in any year. Total grass cover was less than one half of one percent in 1995, slightly increasing to just over 2% in 2000. Grasses and forbs combined, including annuals, account for only

5% of the total vegetative cover in 2000. Bottlebrush squirreltail is the most abundant grass with mutton bluegrass being next. Perennial forbs are nearly non-existent with only one perennial forb being sampled in 1988 and 1995. No perennial forbs were sampled in 2000, and only one annual, tansy mustard, was encountered. Without some type of sagebrush thinning treatment, the herbaceous understory will continue to be extremely poor.

1988 APPARENT TREND ASSESSMENT

Under the shrubs, there is an almost complete cover of pavement-sized fragments, estimated at 32% of the ground cover. Litter cover from the shrubs is almost 50% and basal vegetative cover is low at 6%. The amount of bare soil exposed is also low at 7%, due to very high amounts of pavement. The sagebrush population appears stable with enough young and seedlings to replace dying individuals. The herbaceous understory is in extremely poor condition due to the dominance of sagebrush.

1995 TREND ASSESSMENT

The soil is adequately covered by sagebrush canopy to protect it from high intensity summer storm impacts, but there is little protection of the soil from erosion caused from the associated runoff. However, due to the gentle slope, erosion does not appear to be a major problem. Trend is considered stable, yet in poor condition. Browse trend is stable and fairly stagnant. There is a change in the proportion of individuals in the younger age classes which have declined, yet there are not an inordinately large number of dead plants in the population. Utilization is heavier with 20% of the sagebrush displaying heavy use. Percent decadency has declined and vigor is good on all but 3% of the population. There may be some fluctuations in population density in the future associated with prolonged drought, but the sagebrush will continue to dominate this site without some sort of mechanical or chemical manipulation. The herbaceous understory is severely suppressed and nearly non-existent at this time. This will remain the case until the sagebrush canopy is reduced. Trend for the herbaceous understory is stable, but in very poor condition.

TREND ASSESSMENT
soil - stable, but in poor condition (3)
browse - stable, stagnant, mature sagebrush stand (3)
herbaceous understory - stable, but nearly non-existent (3)

2000 TREND ASSESSMENT

Trend for soil is stable, but remains in poor condition with very little cover from herbaceous vegetation and an increase in bare ground. Trend for browse is stable. The Wyoming big sagebrush population increased in decadency from 19% to 42%, but due to the abundance of sagebrush at the site, this increase is not detrimental. It appears that the sagebrush population may enter a self-thinning period with the extended drought and high intraspecific competition for resources. Trend for the herbaceous understory is stable, but severely depleted due to high sagebrush density and cover.

TREND ASSESSMENT
soil - stable, but remains in poor condition (3)
browse - stable (3)
herbaceous understory - stable, but severely depleted due to high sagebrush density and cover (3)

HERBACEOUS TRENDS --
Herd unit 10 , Study no: 12

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'88	'95	'00	'88	'95	'00	'95	'00
G	Agropyron dasystachyum	$_{c}$59	$_{b}$35	$_{a}$1	26	15	1	.22	.00
G	Bromus tectorum (a)	-	3	-	-	2	-	.01	-
G	Oryzopsis hymenoides	3	2	5	1	1	2	.03	.06
G	Poa fendleriana	$_{a}$1	$_{a}$3	$_{b}$51	1	1	20	.00	.66
G	Sitanion hystrix	$_{a}$24	$_{ab}$52	$_{b}$76	12	24	31	.18	1.35
Total for Annual Grasses		0	3	0	0	2	0	0.00	0
Total for Perennial Grasses		87	92	133	40	41	54	0.43	2.08
Total for Grasses		87	95	133	40	43	54	0.44	2.08
F	Chenopodium leptophyllum (a)	-	$_{b}$84	$_{a}$-	-	33	-	.34	-
F	Cryptantha spp.	1	2	-	1	1	-	.00	-
F	Descurainia pinnata (a)	-	$_{b}$148	$_{a}$3	-	66	1	1.46	.00
F	Lappula occidentalis (a)	-	$_{b}$11	$_{a}$-	-	4	-	.07	-
F	Unknown forb-annual (a)	-	4	-	-	3	-	.01	-
Total for Annual Forbs		0	247	3	0	106	1	1.88	0.00
Total for Perennial Forbs		1	2	0	1	1	0	0.00	0
Total for Forbs		1	249	3	1	107	1	1.89	0.00

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 10 , Study no: 12

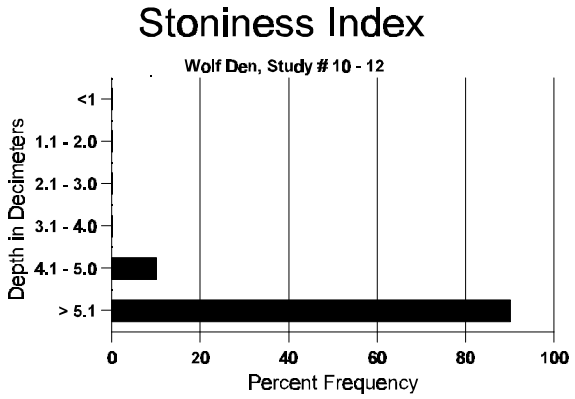
Type	Species	Strip Frequency		Average Cover %	
		'95	'00	'95	'00
B	Artemisia frigida	36	46	1.85	3.03
B	Artemisia tridentata wyomingensis	97	98	32.26	32.55
B	Atriplex canescens	1	0	-	-
B	Atriplex confertifolia	16	18	1.69	.97
B	Chrysothamnus viscidiflorus	0	1	-	-
B	Gutierrezia sarothrae	2	13	.01	.07
B	Juniperus osteosperma	0	7	.15	.18
B	Opuntia spp.	4	3	-	.03
B	Sarcobatus vermiculatus	17	19	2.62	5.28
Total for Browse		173	205	38.59	42.13

BASIC COVER --
Herd unit 10 , Study no: 12

Cover Type	Nested Frequency		Average Cover %		
	'95	'00	'88	'95	'00
Vegetation	284	244	5.75	43.86	41.80
Rock	80	8	.75	.74	.02
Pavement	267	265	32.25	19.73	15.25
Litter	385	366	49.50	43.14	45.29
Cryptogams	175	151	5.00	6.84	9.23
Bare Ground	207	262	6.75	8.53	19.11

SOIL ANALYSIS DATA --
Herd Unit 10, Study # 12, Study Name: Wolf Den

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
26.05	56.0 (18.11)	8.0	46.0	33.4	20.6	1.8	3.5	115.2	0.6



PELLET GROUP FREQUENCY --
Herd unit 10 , Study no: 12

Type	Quadrat Frequency		Pellet Transect	
	'95	'00	Pellet Groups per Acre ⁄00	Days Use per Acre (ha) ⁄00
Rabbit	7	6	26	N/A
Elk	3	4	44	3 (9)
Deer	52	47	151	116 (287)

BROWSE CHARACTERISTICS --
Herd unit 10 , Study no: 12

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia frigida																		
S	88	2	-	-	3	-	6	2	-	-	13	-	-	-	866			13
	95	24	-	-	6	-	-	-	-	-	30	-	-	-	600			30
	00	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	88	7	-	-	1	-	2	-	-	-	10	-	-	-	666			10
	95	15	-	-	5	-	-	-	-	-	20	-	-	-	400			20
	00	24	-	-	3	-	-	-	-	-	27	-	-	-	540			27
M	88	29	3	-	18	-	5	1	-	-	56	-	-	-	3733	7	5	56
	95	61	-	-	21	-	-	-	-	-	82	-	-	-	1640	11	11	82
	00	102	2	-	37	-	-	17	-	-	158	-	-	-	3160	5	9	158
D	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	04%	10%	00%	-55%
'95	00%	00%	00%	+45%
'00	01%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	4532	Dec:	3%
	'95	2040		0%
	'00	3700		0%

Artemisia tridentata wyomingensis																		
S	88	-	-	-	3	-	-	13	-	-	16	-	-	-	1066			16
	95	10	-	-	2	-	-	-	-	-	12	-	-	-	240			12
	00	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
Y	88	9	1	-	10	-	-	3	-	-	21	-	2	-	1533			23
	95	10	2	-	-	-	-	-	-	-	12	-	-	-	240			12
	00	18	-	-	-	-	-	3	-	-	21	-	-	-	420			21
M	88	104	47	11	13	-	-	2	-	-	171	4	2	-	11800	21	16	177
	95	38	191	67	-	-	-	-	-	-	296	-	-	-	5920	27	32	296
	00	72	64	20	21	9	5	-	-	-	190	-	-	1	3820	26	33	191
D	88	43	19	4	5	-	-	1	-	-	49	-	13	10	4800			72
	95	9	52	10	-	-	-	-	-	-	58	-	-	13	1420			71
	00	21	60	36	17	6	5	6	-	-	105	-	-	46	3020			151
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	1080			54
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	1280			64

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	25%	06%	10%	-58%
'95	65%	20%	03%	- 4%
'00	38%	18%	13%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	18133	Dec:	26%
	'95	7580		19%
	'00	7260		42%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Atriplex canescens																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0	43	22	0
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	95	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'88	00%	00%	00%
'95	100%	00%	00%
'00	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	0%
	'95	20		100%
	'00	0		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Atriplex confertifolia																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	95	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	95	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	00	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	88	4	-	-	-	-	-	-	-	-	4	-	-	-	266	22	18	4
	95	14	-	-	-	-	-	-	-	-	14	-	-	-	280	20	23	14
	00	11	-	-	2	1	-	2	-	-	16	-	-	-	320	20	27	16
D	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	95	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	00	-	1	-	1	1	2	-	-	-	1	-	-	4	100			5
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	-18%
'95	00%	00%	00%	+27%
'00	12%	08%	15%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	465	Dec:	14%
	'95	380		16%
	'00	520		19%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus																		
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	00	1	-	-	-	-	-	-	-	-	1	-	-	-	20	4	4	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'95	00%	00%	00%	
'00	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	0	Dec:		-
'95	0			-
'00	20			-

Gutierrezia sarothrae																		
S	88	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	95	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	88	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	00	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
M	88	4	-	-	5	-	-	-	-	-	9	-	-	-	600	7	6	9
	95	3	-	-	-	-	-	-	-	-	3	-	-	-	60	12	8	3
	00	35	-	-	-	-	-	-	-	-	35	-	-	-	700	5	6	35

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	-93%
'95	00%	00%	00%	+93%
'00	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'88	866	Dec:	-
'95	60		-
'00	880		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus osteosperma																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	00	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	00	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	00	4	-	-	-	-	-	-	-	-	4	-	-	-	80	-	-	4
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'95	00%	00%	00%	
'00	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'95	0		-
	'00	140		-

Opuntia spp.																		
Y	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	95	4	-	-	-	-	-	-	-	-	4	-	-	-	80	3	4	4
	00	2	-	-	1	-	-	-	-	-	3	-	-	-	60	5	9	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	+18%
'95	00%	00%	00%	-25%
'00	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	66	Dec:	-
	'95	80		-
	'00	60		-

Pinus edulis																		
S	88	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'95	00%	00%	00%	
'00	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'95	0		-
	'00	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Sarcobatus vermiculatus																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	00	-	-	-	1	-	-	2	-	-	3	-	-	-	60			3
M	88	4	-	-	-	-	-	-	-	-	4	-	-	-	266	33	26	4
	95	172	-	-	-	-	-	-	-	-	26	-	-	-	3440	37	50	172
	00	6	2	3	14	-	-	-	-	-	25	-	-	-	500	40	54	25
D	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	95	21	-	-	-	-	-	-	-	-	-	-	-	-	420			21
	00	4	3	1	3	1	-	-	-	-	7	-	-	5	240			12
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	+93%
'95	00%	00%	00%	-79%
'00	15%	10%	13%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	266	Dec:	0%
	'95	3860		11%
	'00	800		30%